UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 4 1995

OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: Ziram (034805) Reregistration Case No. 2180. Additional Residue Field Trial Data on Apples, Peaches, and Apricots. Residue Data on Almond Hulls. Proposed Label Amendments. CBRS No. 13957. DP Barcode D205009. MRID Nos. 43282501, 43282502, and 43282503.

FROM: Catherine Eiden, Chemist
Special Review Section II
Chemistry Branch II -- Reregistration Support
Health Effects Division (7509C)

THROUGH: Sue Hummel, Acting Section Head
Special Review Section II
Chemistry Branch II -- Reregistration Support
Health Effects Division (7509C)

THROUGH: Francis Suhre, Acting Chief
Chemistry Branch II -- Reregistration Support
Health Effects Division (7509C)

TO: Ron Kendall
Reregistration Section I
Accelerated Reregistration
Special Review and Reregistration Branch

In response to a request from the Ziram Task Force (UCB Chemicals and Elf Atochem North America) CBRS met with members of the Task Force on January 12, 1995 to discuss several issues. (See S. Hummel memo of 4/95, CBRS No. 15121.) Specific issues regarding deficiencies in residue field trial data the IR-4 program and other related topics (metabolism and processing study requirements) were on the meeting agenda. Residue field trial data were submitted by the Task Force relevant to the meeting. This memorandum is a formal response to the issues discussed during the meeting and includes a brief review of the residue field trial data submitted.

Tolerances for residues of ziram in or on plant commodities have been established and are listed in 40 CFR §180.116; these tolerances are expressed in terms of ziram (zinc dimethyldithiocarbamate), calculated as zinc ethylenebisdithiocarbamate. For the enforcement of plant commodity

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that contains at least 50% recycled fiber

tolerances, colorimetric methods are referenced in PAM Vol II and listed as Methods I, II, III, and IV; these methods are based on the decomposition of dithiocarbamate into CS_2. No tolerances for residues of ziram in animal commodities have been established.

Codex MRLs for residues of dithiocarbamates have been established in or on plant commodities and are expressed in terms of mg CS_2/kg. Efforts to harmonize the U.S. tolerances and Codex MRLs cannot be made at this time because of differences in expression of the regulated compounds.

BACKGROUND

In the Phase IV review dated 4/16/91 (C. Olinger) for ziram, several deficiencies in the crop field trials used to generate residue data were noted. These deficiencies are given below on a crop basis [re: formulations: WDG = water dispersible granules, WP = wettable powder]:

almonds -

no data on almond hulls,
application rates did not include maximums of 9-12 lb ai/A,
wettable powder, WDG and flowable formulations must be used in field trials,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used,
test must be conducted in CA, and
tolerance on almond hulls must be proposed.

apples/pears -

application rates did not include maximums of 11.8 lb ai/A,
no data representing a 0 day PHI,
only one aerial trial conducted,
dust, wettable powder, WDG and flowable formulations must be used in field trials,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used, and
test must be conducted in major commodity regions.

apricots -

application rates up to 7.6 lb ai/A must be used,
no aerial trials were conducted,
dust, wettable powder, WDG and flowable formulations must be used in field trials, and
maximum number of applications/minimum PHI must be

used.

cherries -

all application parameters were not included,
trials at the minimum PHI are required,
trials with the flowables must be conducted,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used, and
test must be conducted in major commodity regions.

nectarines -

application rates did not include maximums of 11 lb ai/A,
dust, wettable powder, WDG and flowable formulations must be used in field trials,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used, and
test must be conducted in major commodity regions.

peaches -

application rates did not include maximums of 11.25 lb ai/A,
dust, wettable powder, WDG and flowable formulations must be used in field trials,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used, and
test must be conducted in major commodity regions.

pecans -

application rates did not include maximums of 15 lb ai/A,
wettable powder, WDG and flowable formulations must be used in field trials,
maximum number of applications/minimum PHI must be used,
aerial and ground equipment must be used, and
test must be conducted in major commodity regions.

The Ziram Task Force sought to address these deficiencies during the meeting. They provided summaries of previously submitted residue trial data on apples, pears, apricots, cherries, nectarines, peaches, almonds, and pecans. They also provided copies of new proposed labels (letter dated 12/9/94) for the WDG and wettable powders (WP) formulations. The proposed labels were developed from the existing residue field trial data for apples, pears, apricots, cherries, nectarines, peaches, almonds, and pecans. It is the registrant's intention "to develop one Ziram label for the Task Force with the same agricultural uses and directions on all labels". This proposed label reflects the maximum application rates, formulations, minimum PHIs and

application equipment used to generate existing residue trial data. In this way, the Ziram Task Force hopes to address all deficiencies noted in the Phase IV review.

With regard to the deficiencies noted above pertaining to the methods of application that should be tested in the field trials, updated policy on aerial applications has been issued as, "Requirement for Crop Field Trials to Support Aerial Applications", dated 12/6/91, and states:

> Provided that the pesticide product label specifies that aerial applications are to be made in a minimum of 2 gallons water per acre (or 10 gallons per acre in the case of tree crops), crop field trials reflecting aerial application will no longer be required in those cases where adequate data are available from use of ground equipment reflecting the same application rate, number of applications, and preharvest interval. This data waiver does not apply to aerial applications using diluents other than water (e.g., vegetable oils). In addition, we do reserve the right to require aerial data if special circumstances warrant it.

CONCLUSIONS

General

1. All label use directions for aerial applications of ziram are in accordance with the above policy. Proposed product labels specify that for the fruit and nut tree crops listed on the label aerial applications are to be made in a minimum of 10 gpa of water, and ground applications are to be made in a minimum of 20 gpa of water.

2. With regard to the deficiencies noted above pertaining to types of formulations of the product to be tested, CBRS considers the DF (dry flowable), WDG (water dispersible granular) and the WP (wettable powders) to be equivalent for the purposes of residue trials. The registrants state that they are no longer supporting the flowable concentrate formulation. From the data submitted, it appears that a ziram flowable concentrate formulation is registered. This formulation would not be considered comparable to the WP, WDG and DF formulations.

Proposed Use

3. Proposed labels have limited the application rates, the total number of applications allowed per season, and changed post-harvest intervals (PHIs) to correspond to existing residue data. The adequacy of these residue data will be addressed in the conclusions given below for each crop.

Plant Metabolism

4. An apple metabolism study has been submitted and is awaiting review. Based on the uses the registrants have proposed to support, either a tomato or grape metabolism study will be needed to fulfill GLN 171-4(a). If use on a leafy, root, grain, oilseed or legume crop is proposed later, a third plant metabolism study will be needed.

Animal Metabolism

5. The submitted goat metabolism study is under review. Based on the proposed uses of ziram, there is no need for a poultry metabolism study. This study requirement has been waived (RCB memo dated 7/21/87, J. Garbus, RCB No. 2380).

Residue Trials

Because the need for additional field trial data was primarily addressed by proposing label changes, existing field trial data will be summarized in this review along with new field trial data.

Apples.

6. Existing residue trial data for apples and pears treated with the WDG (granular) and WP (wettable powder) formulations support the new proposed labels for these formulations of ziram. Previously noted deficiencies in the existing residue trial data have been addressed with the proposed label changes. The existing residue trial data for apples grown in NY, MI, IL, GA, CA and WA are acceptable. Apples grown in the six states represented in the residue trials account for 70% of the 1985 apple crop in the U.S. Residues of ziram on apples at the proposed PHI (14 days for Eastern states) and resulting from the proposed maximum application of 24.3 lbs a.i./A were below the established 7 ppm tolerance in the NY, MI, GA and IL trials. Residues were below 7 ppm in CA and WA at the 14-day PHI proposed for Western states.

7. Data submitted as an addendum (MRID No. 43282501) to previously submitted residue trial data for apples (MRID NO. 41229802) are acceptable. These supplemental data provide information on ziram residues on apples treated in NY using an aerial application of the WDG formulation. All residues were below the established tolerance of 7 ppm for ziram on apples.

Pears.

8. Existing residue data for pears treated with the WDG (granular) formulation support the new proposed labels for the WDG and WP formulations of ziram. Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for pears (NY, CA and WA) are acceptable. Pears grown in the three states represented in the residue trials account for 71% of the 1985 apple crop in the U.S. Residues of ziram were below the established 7 ppm tolerance in the NY, CA and WA trials for ziram on pears harvested at the proposed PHIs, 14 days in the Eastern states and 5 days in the Western states.

Apricots.

9. Existing residue data for apricots treated with the WDG (granular) formulation support the new proposed labels for the WDG and WP formulations of ziram. Previously noted deficiencies in the existing residue trial data have been addressed with the proposed label changes. The existing residue data for apricots (CA and WA) are acceptable. Apricots grown in CA represent 97% of the 1982 U.S. apricot crop. Residues of ziram were below the established 7 ppm tolerance in the CA and WA trials for ziram on apricots at the proposed 30-day PHI.

10. Data submitted as an addendum (MRID No. 43282502) to previously submitted residue data for apricots (MRID NO. 41153101) are acceptable. These supplemental data provide information on ziram residues on apricots treated in CA and WA using aerial and ground applications of the WDG formulation. All applications were made at 6.08 lb ai/A (5 applications) for a total application of 30.4 lbs ai/A total/season. (This application rate represents 1.33X the new proposed label rate of 22.8 lbs ai/A total/season.) All residues from aerial applications at this exaggerated rate of ziram were below the established tolerance of 7 ppm on apricots. Ziram residues from ground applications were below 7 ppm on apricots harvested at least 45 days after the last application. However, ziram residues approached or exceeded the 7 ppm tolerance on apricots harvested at the 30-day PHI after the last application. The highest residue measured 11.1 ppm after 3 to 4 months in frozen storage. Storage stability data indicate a 40% decrease in ziram residues after a 4 month storage period under the conditions of the study. Correction for losses in storage indicate residues as high as 16 ppm, potentially at harvest. <u>The registrant must raise the PHI to 45 days or the registrant must petition to raise the tolerance to 20 ppm for ziram on apricots.</u>

Peaches.

11. Existing residue data for peaches treated with the WDG (granular) and flowable concentrate formulations support the new

proposed labels for the WDG and WP formulations of ziram. Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for peaches grown in SC, NJ, MI, CA and WA are acceptable. The WDG formulation was used in all states except SC, where the flowable concentrate was applied. Peaches grown in the five states represented in the residue trials account for 70% of the 1985 peach crop in the U.S. Residues of ziram were below the established 7 ppm tolerance in the CA and WA trials for peaches harvested at the proposed 30-day PHI. Residues of ziram were below the established 7 ppm tolerance in the MI and NJ trials for ziram on peaches harvested at the proposed 14-day PHI. Residues in a SC trial using the flowable concentrate formulation were above the established tolerance. The registrants propose to resolve this problem by no longer supporting this formulation.

12. Data submitted as an addendum (MRID No. 43282503) to previously submitted residue data for peaches (MRID NO. 41153104) are acceptable. These supplemental data provide information on ziram residues on peaches treated with the WDG formulation in GA at 5.0 lbs ai/A (6 applications) for a total of 30 lbs ai/A/season with ground equipment. Residues of ziram are greater than the 7 ppm tolerance at the 7-day PHI and less than the tolerance at the 21-day PHI. The registrant is proposing a 14-day PHI. Based on interpolation, residues at the 14-day PHI would be within tolerance at the 14-day PHI.

Cherries.

13. Existing residue data for cherries treated with the WDG (granular) formulation support the new proposed labels for the WDG and WP formulations of ziram. Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for cherries grown in CA, MI and WA are acceptable. Cherries grown in these three states represent 70% of the 1985 U.S. sweet cherry crop. Residues of ziram were below the established 7 ppm tolerance in all of the trials for ziram on cherries harvested at the proposed PHIs, 7 days in the Eastern states and 30 days in the Western states.

Nectarines.

14. Existing residue data for nectarines treated with the WDG (granular) formulation support the new proposed labels for the WDG and WP formulations of ziram. Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for nectarines grown in CA and GA are acceptable. Nectarines grown in these two states represent 97% of the 1982 U.S. nectarine crop. Residues of ziram were below the established 7 ppm tolerance in all of the trials for ziram on nectarines harvested at the proposed PHIs, 14 days in the Eastern states and 30 days in the Western states.

Pecans.

15. Existing residue data for pecans treated with the WDG (granular), WP (wettable powder) and flowable concentrate formulations support the new proposed labels for the WDG and WP formulations of ziram. (The registrant reports that they are no longer supporting the flowable concentrate formulation.) Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for pecans grown in OK, NM, TX and GA are acceptable. Pecans grown in these four states represent 97% of the 1985 U.S. pecan crop. Residues of ziram were below the established 7 ppm tolerance in all of the trials for ziram on pecans harvested at the proposed 51-day PHI.

Almonds.

16. Existing residue data for almonds treated with the WDG (granular), WP (wettable powder) and flowable concentrate formulations support the new proposed labels for the WDG and WP formulations of ziram. (The registrant reports that they are no longer supporting the flowable concentrate formulation.) Previously noted deficiencies in the existing residue data have been addressed with the proposed label changes. The existing residue data for almonds grown in CA are acceptable. Almonds grown in CA represent the majority of the U.S. almond crop. Residues of ziram in or on nut meats were below the established 0.1 ppm tolerance in all of the trials for ziram on almond harvested at all PHIs (125 to 205 days). No numerical PHI has been established.

17. Available residue data from 7 field trials in CA show a range of ziram residues from 0.275 to 18.6 ppm on almond hulls. A tolerance for ziram on almond hulls is needed at 25 ppm. A tolerance of 20 ppm would be adequate if the flowable concentrate formulation is cancelled. (See Detailed Considerations.)

Processing Studies

18. The apple processing study submitted by the registrants is adequate. Processing studies on tomatoes and grapes are still needed to fulfill GLN 171-4(l).

RECOMMENDATIONS

The registrant should be advised that existing residue data support the proposed label amendments for ziram-containing products (active ingredient: zinc dimethyldithiocarbamate) Ziram Granuflo® (76% water dispersible granules) and Ziram 76® (wettable powder). No new residue field trial data (GLN 171-4(k)) will be required to support the proposed uses on the WP and WDG labels in the current submission provided the residue(s) of concern can be converted to

CS_2 using the existing enforcement method and all end use labels are changed to match the proposed labels included in this submission. Additional data are needed to support formulations other than the WP, WDG and DF. If the registrants are no longer supporting the flowable concentrate product formulations containing ziram, all flowable concentrate formulations should be cancelled.

The registrants should propose a tolerance for ziram on almond hulls of 20 ppm. This tolerance should adequately cover residues from applications of the WDG and WP formulations, likely to be present on the rac at the time of harvest, "at the farm gate", prior to handling and storage.

The registrants should propose either a 45-day PHI for apricots or petition for a 20 ppm tolerance. The existing tolerance is 7 ppm.

The registrant should be advised to complete the processing studies (GLN 171-4 (1)) for tomatoes and grapes, and conduct a second plant metabolism study preferably on grapes or tomatoes.

We recommend the registrant be provided a complete copy of our review.

DETAILED CONSIDERATIONS

Proposed Use

The registrants have proposed new labels for the WDG and WP formulations of ziram [Ziram Granuflo® (76% water dispersible granules) and Ziram 76® (wettable powder)]. These new labels are supported by the residue field trial data summarized above. That is, maximum pounds of active ingredient that may be applied per season per acre and minimum PHIs in the proposed labels are based directly on the residue field trial data submitted and reviewed. The WP product label, where not identical to the WDG product label, allows a lower maximum total use and a longer PHI. Proposed maximum seasonal pounds of active ingredient and minimum PHIs for the WDG formulation are given below in Table 1:

Table 1. Proposed Label Information for Ziram Granuflo® (WDG)

RAC	Rate (lbs. a.i./acre)	Maximum Pounds a.i./season	PHI (days)
Apples	6.08	24.3 (West)	14
Apples	6.08	42.6 (East)	14
Pears	6.08	24.3 (West)	5
Pears	6.08	42.6 (East)	14

RAC	Rate (lbs. a.i./acre)	Maximum Pounds a.i./season	PHI (days)
Apricots	4.56	22.8	30
Peaches	6.08	42.6 (West)	30
Peaches	6.08	54.8 (East)	14
Nectarines	6.08	42.6 (West)	30
Nectarines	6.08	54.8 (East)	14
Cherries	4.56	22.8 (West)	30
Cherries	4.56	36.5 (East)	7
Pecans	6.08	48.6	51
Almonds	6.08	24.3	N/A

Nature of the Residue

Plant (apple) and animal (goat) metabolism studies have been submitted and are under review. Based on the uses the registrants' have proposed to support, either a tomato or grape metabolism study will be needed to fulfill GLN 171-4(a). If use on a leafy, root, grain, oilseed or legume crop is proposed later, a third plant metabolism study will be needed.

The submitted goat metabolism study is under review. Based on the proposed uses of ziram, there is no need for a poultry metabolism study. This study requirement has been waived (RCB memo dated 7/21/87, J. Garbus, RCB No. 2380).

Analytical Method

In summary, ziram is converted to CS_2 in a sealed reaction flask, and an aliquot of the headspace gas is analyzed by gas chromatography. A crop sample is ground with ice and frozen at -20$_o$C until analyzed. A 4 g sub-sample is placed in a reaction vial. EDTA and HCL/Stannous chloride are added and the vial is sealed immediately and placed in a boiling waterbath for 2 hours. The reaction vial is shaken periodically. Once the reaction is complete, a sample of the headspace in the reaction vial is taken with an airtight syringe for injection onto a gas chromatograph equipped with a flame photometric detector in sulfur mode.

Storage Stability

Storage stability data exist for apples (pome fruits), peaches (stone fruits), almonds and almond hulls (tree nuts). Samples were

fortified with ziram at 2.0 ppm and stored frozen at -20°C and analyzed at varying intervals. Residues of ziram are stable on almond and pecan nutmeats after 3 to 6 months of frozen storage (-20°C). Residues of ziram are unstable in peaches, apricots, nectarines, cherries, apples, pears, and almond hulls after 3 months of frozen storage (-20°C), decreasing by 25 to 30%. Because of this instability upon storage, residue data were corrected for storage losses for comparison against the 7 ppm tolerance. In most cases, residues were still within tolerance.

In accordance with CBRS policy on translating storage stability data between crops within the same crop group (40 CFR 180.34 (f)), these data support the residue field trial studies reviewed here for apples, pears (pome fruits), peaches, nectarines, cherries, apricots (stone fruits), and almonds and pecans (tree nuts).

Residue Trials

Apples. Six field trials were conducted in six states: NY, MI, GA, IL, CA and WA (MRID Nos. 92045005, 41229802). Five of the trials used ground application equipment and one trial used aerial application equipment (WA) to apply either the WDG, WP or flowable concentrate formulation of ziram. All trials used an application rate of 6.08 lbs. a.i./A. In the Eastern states 7 applications (total seasonal maximum = 42.6 lbs. a.i./A) were made, and in the Western states, 4 applications were made (total seasonal maximum = 24.3 lbs. a.i./A). All applications with ground equipment were made in approximately 40 gpa of water or greater. The one aerial application was made in 10 gpa of water. Samples were harvested at 14 and 21 days after the last application in the East and at 5 and 21 days after the last application in the West. All residues were below the established 7 ppm tolerance for apples with the exception of one sample in IL and two samples in CA. The high residue in IL was attributed to 8 applications of ziram WDG instead of 7. High residues in CA were attributed to samples collected at a 5-day PHI.

Samples were stored frozen for 1 to 3 months prior to residue analysis. Storage stability studies showed a 13% decrease after 1 month of frozen storage, and a 30% decrease after 3 months of frozen storage (-20 °C). The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 74 to 104%.

Data submitted for a field trial conducted in NY using aerial application equipment provided supplemental information on residues resulting from aerial application (MRID No. 43282501). The WDG formulation was applied 7 times at 6.08 lbs. a.i./A in 5.6 gpa of water. All residues were below 7 ppm on the apples harvested at 14 and 21 days post-application. Proposed label language for the ziram WDG formulation calls for aerial application in a minimum of

10 gpa of water. Samples were analyzed for residues within 1 month of collection. Average recoveries from fortified apple samples were 90%.

Pears. Three field trials were conducted in three states: NY, CA and WA (MRID Nos. 42045011, 41153102). All of the trials used ground application equipment to apply the WDG formulation of ziram. All trials used an application rate of 6.08 lbs. a.i./A.; In NY, 7 applications were made (total seasonal maximum = 42.6 lbs. a.i./A) and for each trial in CA and WA, 4 applications were made (total seasonal maximum = 24.3 lbs. a.i./A). All applications with ground equipment were made in approximately 37 to 50 gpa of water. Samples were harvested at 14 and 21 days after the last application in the East and at 5 and 14 days after the last application in the West. All residues were below the established 7 ppm tolerance for pears in all samples analyzed. Storage stability studies in pears showed a 13% decrease after 1 month of frozen storage, and a 30% decrease after 3 months of frozen storage (-20°C). Samples were stored frozen 1 to 3 months prior to residue analysis. The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 72 to 94%.

Apricots. One field trial was conducted in CA. The trial used ground application equipment to apply the WDG formulation of ziram (MRID Nos. 92055007, 41153101). An application rate of 4.56 lbs. a.i./A. was used and 5 applications were made (total seasonal maximum = 22.8 lbs. a.i./A). All applications with ground equipment were made in approximately 41 to 51 gpa of water. Samples were harvested at 30, 45 and 60 days after the last application. All residues were below the established 7 ppm tolerance for apricots in all samples analyzed.

Storage stability studies in apricots showed a 40% decrease after 4 months of frozen storage (-20°C). Samples were stored frozen for approximately 4 months prior to residue analysis. The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 80 to 115%.

Data submitted for three field trials conducted in CA (2) and WA (1) using ground and aerial application equipment provided supplemental information on residues resulting from aerial application (MRID No. 43282502). The WDG formulation was applied 5 times at 6.0 to 7.0 lbs. a.i./A in 40 to 50 gpa of water for ground application and in 10 gpa of water for aerial application. All residues were below 7 ppm on the apricots harvested at the 45-day and 60-day PHIs. Residues on apricots treated with ground application and harvested at the 30-day PHI were above the tolerance, while residues on the fruits treated with aerial equipment and harvested at the 30-day PHI were below the tolerance. Samples were analyzed for residues within 3 to 4 months of collection. Loss in storage is expected to be between 30 and 40%.

The average recovery from fortified apricots samples was 83%. The limit of detection was 0.02 ppm.

Peaches. Seven field trials were conducted in five states: NJ, MI, SC, CA and WA (MRID Nos. 92045010, 41153104). Six of the trials used ground application equipment and one trial used aerial application equipment (CA). The WDG formulation of ziram was used in all trials except in SC where the flowable concentrate formulation was used. All trials used an application rate of 6.08 lbs. a.i./A. In the Eastern states 10 applications were made (total seasonal maximum = 60.8 lbs. a.i./A) and in the Western states 7 applications were made (total seasonal maximum = 42.6 lbs. a.i./A). All applications with ground equipment were made in approximately 50 gpa of water or greater. The one aerial application was made in 9.5 gpa of water. Samples were harvested at 7, 14 and 21 days after the last application in the East and at 30, 45 and 60 days after the last application in the West. All residues were below the established 7 ppm tolerance for peaches with the exception of samples collected from the field trial in SC where the flowable concentrate formulation was used. One sample harvested in MI at the 7-day PHI approached the tolerance. The high residues in SC were attributed to application of ziram flowable concentrate no longer supported by the registrants. The PHI on the proposed label for Eastern states is 14 days, and 30 days for Western states.

Samples were stored frozen for 2 to 4 months prior to residue analysis. Storage stability studies showed a 30% decrease after 3 months of storage, and a 40% decrease after 4 months of storage (-20°C). The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 80 to 110%.

Data submitted for an additional field trial conducted in GA using ground application equipment were provided (MRID No. 43282503). The WDG formulation was applied 6 times at 5.0 lbs. a.i./A in a minimum of 25 gpa of water. Residues on peaches harvested at the 7-day PHI were all above the 7 ppm tolerance. Residues on peaches harvested at the 21-day PHI were all below the 7 ppm tolerance. Linear regression analysis was performed on all residue data collected at 7, 14 and 21-day intervals. The analysis included a data set that was corrected for storage losses and one that was not corrected for losses. The analysis indicated that all residues (corrected and uncorrected) would be within tolerance at the 14-day PHI.

Samples were stored frozen for 3 to 4 months. The limit of detection on the method was 0.02 ppm. The range of recoveries from fortified samples was 82%.

Cherries. Five field trials were conducted in three states: MI, CA and WA (MRID Nos. 92045008, 41153103). Three of the trials (MI, CA

and WA) used ground application equipment and two trials (MI, CA) used aerial application equipment to apply the WDG formulation of ziram. All trials used an application rate of 4.56 lbs. a.i./A. In MI, 8 applications were made (total seasonal maximum = 36.5 lbs. a.i./A) and in the Western states 5 applications were made (total seasonal maximum = 22.8 lbs. a.i./A). All applications with ground equipment were made in approximately 50 gpa of water. The aerial applications were made in 10 gpa of water. Samples were harvested at 7, 14 and 21 days after the last application in MI and at 30, 45 and 60 days after the last application in the West. All residues were below the established 7 ppm tolerance for cherries harvested at all intervals regardless of application equipment used.

Samples were stored frozen for 3 to 5 months prior to residue analysis. Storage stability studies showed a 30% decrease after 3 months of storage, and a 50% decrease after 6 months of storage (-20°C). The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 76 to 114%.

Nectarines. Three field trials were conducted in two states: GA, and CA (MRID Nos. 92045009, 41229801). Two of the trials (CA and GA) used ground application equipment and one trial (CA) used aerial application equipment to apply the WDG formulation of ziram. All trials used an application rate of 6.08 lbs. a.i./A. In GA, 10 applications were made (total seasonal maximum = 60.8 lbs. a.i./A) and in the CA, 7 applications were made (total seasonal maximum = 42.6 lbs. a.i./A). All applications with ground equipment were made in approximately 50 gpa of water. The aerial application was made in 10 gpa of water. Samples were harvested at 7, 14 and 21 days after the last application in GA, and at 30, 45 and 60 days after the last application in the CA. All residues were below the established 7 ppm tolerance for nectarines harvested at all intervals regardless of application equipment used.

Samples were stored frozen for 2 to 3 months prior to residue analysis. Storage stability studies showed no decrease in residues after 1 month of frozen storage, and a 29% decrease after 3 months of frozen storage (-20°C). The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 76 to 111%.

Pecans. Four field trials were conducted in four states: GA, OK, NM, and TX (MRID Nos. 92045012, 41229803). The trial used ground application equipment to apply the WDG of ziram. An application rate of 6.08 lbs. a.i./A. was used and 8 applications were made in GA, OK and TX (total seasonal maximum = 48.6 lbs. a.i./A). In NM, 8 applications at 5.0 lbs. a.i./A each were made (total seasonal maximum = 40 lbs. a.i./A). All applications with ground equipment were made in approximately 70 to 200 gpa of water. Samples were harvested at 51, 57, 63, and 83 days after the last application at

the GA, TX, OK and NM trial sites, respectively. All residues were below the established 0.1 ppm tolerance for ziram in or on pecans for all samples analyzed.

Storage stability studies showed a 10% decrease after 3 months of frozen storage and a 12% decrease after 6 months frozen storage (-20°C). Samples were stored frozen for 3 to 5 months prior to analysis. The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 70 to 101%.

Almonds (nut meats). Seven field trials were conducted in CA (MRID Nos. 92045006, 41153106). Five of the trials used ground application equipment to apply the WDG, WP and flowable concentrate formulations of ziram, and two used aerial application equipment to apply the WDG and flowable concentrate formulations of ziram. An application rate of 6.08 lbs. a.i./A. was used at six of the test sites and 7.3 lbs. a.i./A was used at one site. Each site was subdivided into two subplots one of which received an application 4 times while the other was treated 3 times with ziram at the aforementioned rates (total seasonal maximum = 29.2 lbs. a.i./A). All applications with ground equipment were made in approximately 30 to 50 gpa of water. The aerial applications were made in 10 gpa of water. Samples were harvested at various intervals (125 to 211 days) after the last application on the sites. All residues were below the established 0.1 ppm tolerance for ziram in or on almond nut meats for all samples analyzed.

Storage stability studies showed a 10% decrease after 3 months of frozen storage and a 12% decrease after 6 months frozen storage (-20°C). Samples were stored frozen for 5 to 6.5 months prior to residue analysis. The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 76 to 92%.

Almonds (hulls). Seven field trials were conducted in CA (MRID Nos. 92045006, 41153106). Five of the trials used ground application equipment to apply the WDG, WP and flowable concentrate formulations of ziram, and two used aerial application equipment to apply the WDG and flowable concentrate formulations of ziram. An application rate of 6.08 lbs. a.i./A. was used at six of the test sites and 7.3 lbs. a.i./A was used at one site. Each site was subdivided into two subplots one of which received an application 4 times while the other was treated 3 times with ziram at the aforementioned rates (total seasonal maximum = 29.2 lbs. a.i./A). All applications with ground equipment were made in approximately 30 to 50 gpa of water. The aerial applications were made in 10 gpa of water. Samples were harvested at various intervals (125 to 211 days) after the last application on the sites.

Storage stability studies showed a 25% decrease after 3 months of frozen storage (-20°C). No data for longer storage periods were reported. Samples were stored frozen for 3 to 6.5 months prior to

residue analysis. The limit of detection on the method was 0.05 ppm. The range of recoveries from fortified samples was 70 to 98%.

Residues ranged from a low of 0.275 to a high of 18.6 ppm in or on almond hulls for all samples analyzed. If residue values are corrected for <u>at least</u> a 25% loss expected to occur while in frozen storage, then 16% of the samples analyzed approach or exceed a theoretical 15 ppm tolerance. Approximately 5% of the samples approach or exceed a theoretical 20 ppm tolerance. Based on all of the residue trial data, once corrected for a 25% loss while in storage, a 25 ppm tolerance would adequately cover residues expected at the farm gate. (See Table 2).

However, the highest values were the result of applications of the flowable concentrate formulation of ziram. If the flowable concentrate formulations of ziram are cancelled, then a tolerance of 20 ppm should cover the highest residues found even after a correction for a 25% loss during storage. The registrant reports that they are no longer supporting the flowable concentrate formulation of ziram because of technical problems.

Table 2. Residues of Ziram on Almond Hulls

PPM ZIRAM[a]					
FORMULATIONS APPLIED					
WDG		Flowable Conc.		WP	
Uncorr.	Corr.	Uncorr.	Corr.	Uncorr.	Corr.
5.68	7.10	9.32	11.60	4.05	5.06
0.473		1.21		0.875	
9.75	12.20	17.60	22.00	10.10	12.62
8.65	10.80	12.50	15.62	10.10	12.62
10.60	13.25	12.10	15.12	11.60	14.50
8.44	10.55	9.83	12.28	7.22	9.02
0.341		0.564		1.24	
0.371		1.21		0.932	
0.388		0.703		0.939	
0.337		0.676		0.878	
10.80	13.50	16.90	21.12	12.80	16.00
12.20	15.25	16.90	21.12	13.50	16.87
11.50	14.37	10.10	12.62	12.20	15.25
9.98	12.47	18.60	23.25	10.70	13.37
0.949		1.42		0.844	

PPM ZIRAM[a]					
FORMULATIONS APPLIED					
WDG		Flowable Conc.		WP	
Uncorr.	Corr.	Uncorr.	Corr.	Uncorr.	Corr.
0.654		1.42		1.05	
0.464		2.16		0.844	
0.506		1.28		1.72	
2.70					
2.06					
1.85					
1.72					
0.618					
0.929					
0.405					
0.432					
0.05					
1.25					
13.80	17.25				
12.15	15.18				
0.764					
0.811					
0.743					
0.676					
		7.09			
		8.95			
		6.30			
		2.61			
		2.56			
		2.11			
		2.53			
3.54					
5.99					
1.70					
3.08					

PPM ZIRAM[a]					
FORMULATIONS APPLIED					
WDG		Flowable Conc.		WP	
Uncorr.	Corr.	Uncorr.	Corr.	Uncorr.	Corr.
0.401					
0.372					
0.275					
0.365					

a) Corr. = corrected for a 25% loss of residue while in storage.
Uncorr. = the reported value uncorrected for residue losses while in storage.

Processing Studies

An apple processing study has been submitted and reviewed (memo dated 6/15/93, C. Swartz). The apple processing data are adequate. A processing study was required in the Phase IV review (4/16/91) for tomatoes. The registrants have committed to conducting processing studies for tomatoes and grapes.

The submitted goat metabolism study is under review. The need for animal feeding studies will be determined when the review is completed.

cc: RF, SF, C. Eiden, Ziram Reg. Std. File, Circ.
RDI: SH 3/29/95 FBS 4/4/95
7509C: CE: ce: CM#2: 4/4/95